RESEARCH PLAN

FOR

CHARACTERIZATION OF BRAIN TISSUES TROUGH IMAGE REGISTRATION TECHNIQUES

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INTRODUCTION

Image registration is a process, which geometrically aligns two or more images of the same scene taken from different directions and from different sensors. Image registration is a very important step in the process of analysing an image through which necessary information is found by combining images from different data sources. Generally image registration required in remote sensing area like monitoring satellite images, environment, weather forecasting, in medical image processing combining CT, monitoring tumour growth, image fusion and in computer vision. [9]

Due to the diversity of images to be registered and due to various types of degradations it is impossible to design a universal method applicable to all registration tasks. it is still rare to find an accurate, robust, and automatic image registration method. Every method should take into account not only the assumed type of geometric deformation between the images but also radiometric deformations and noise corruption, registration accuracy and application-dependent data characteristics. These challenges are to be addressed.

LITERARUTE REVIEW

Generally image registration process follows the following steps.

The first step of image registration is pre-processing which enhances the quality of the image by removing noise or doing necessary steps required for further processing.

After pre-processing the next step is feature extraction. This step involves - extracting the invariant features which are common in both the base image and reference images. Features which should be invariant to scaling, rotation, time shift. There are more feature extraction methods like Hassian, Harris, SURF (Speed Up Robust Feature), SIFT (Scale Invariant Fourier Transform) [2], PCA-SIFT, features, Salient points. But each one has its own advantages and disadvantages. Still there is room for improvement in feature extraction methods.

Matching the common features extracted earlier from the two images and two images will be aligned or matted or fused or used for further applications. So many feature matching methods also exist like Nearest Neighbour, KD tree (k-dimensional) algorithm etc. Few Feature matching methods takes log time to match with significant accuracy. So computational improvement need to be addressed.

The type and parameters of the so-called mapping functions, aligning the sensed image with the reference image, are estimated from matched features or feature locations. [3] The parameters of the mapping functions are computed by means of the established feature correspondence methods.
The sensed image is transformed by means of the mapping functions. Image values in non-integer coordinates are computed by the appropriate interpolation technique.

RESEARCH GAP:

From the literature survey it is found that:

- Variety of registration methods like CC (Cross Correlation), MI (Mutual Information), SIFT (Scale Invariant Fourier Transform), SURF (Speed Up Robust Feature) etc. are available for enhancing the features of medical images. But up to date registration methods are needed to find which method suits best for medical image registration.
- Automatic image registration is still an open challenge because the registration of the images with complex deformations is the most challenging task.
- Characterize the tumor portion of the brain using textural features of CT/MRI Image obtained through the image registration techniques is the unique thing one can look for in the applications of image registration

.OBJECTIVES OF THE PROPOSED RESEARCH WORK

The proposed research work will involve the following Objectives:

1. Comparison between different registration methods like cross correlation, MI and SIFT and select the best method which suits for CT/MRI images
2. To propose a new registration technique for the deformed images.
3. Application of the proposed method for different medical images like cardiac and lung
4. Characterizing the brain tissues of the registered image

APPROACH / METHODOLOGY INTENDED TO BE ADOPTED

OBJECTIVE 1: Comparison between different registration methods like cross correlation, MI and SIFT and select the best method which suits for CT/MRI images

The research work will be done as follows:

- To study the specified methods
- Analysis of CC, MI and SIFT methods using MATLAB software
- Comparison with respect to the speed and accuracy

OBJECTIVE 2: To propose a new multi modal image registration technique for the deformed images.

Multi-modal image registration plays a significant role in medical image processing. Mutual information (MI) is an effective criterion for the multi-modal medical image registration. However, even with this method, the correct alignment is not guaranteed, especially when it is applied to images with low resolution or small overlapped region, because the traditional MI function only includes intensity information of images and lacks sufficient special information to accurately measure the degree of alignment of two images, and besides, it is apt to be influenced by intensity interpolation, therefore presents many local maxima which frequently lead to misregistration.

The research work will be done as follows:

- The idea behind the new registration technique to be developed is to integrate two recent techniques like SIFT and Fourier Mellin Transform to generate a registered image using MATLAB software.
- Compare the proposed methods with the existing methods Like CC, SIFT and SURF using MATLAB software

OBJECTIVE 3: Application of the proposed method for different medical images like cardiac and lung

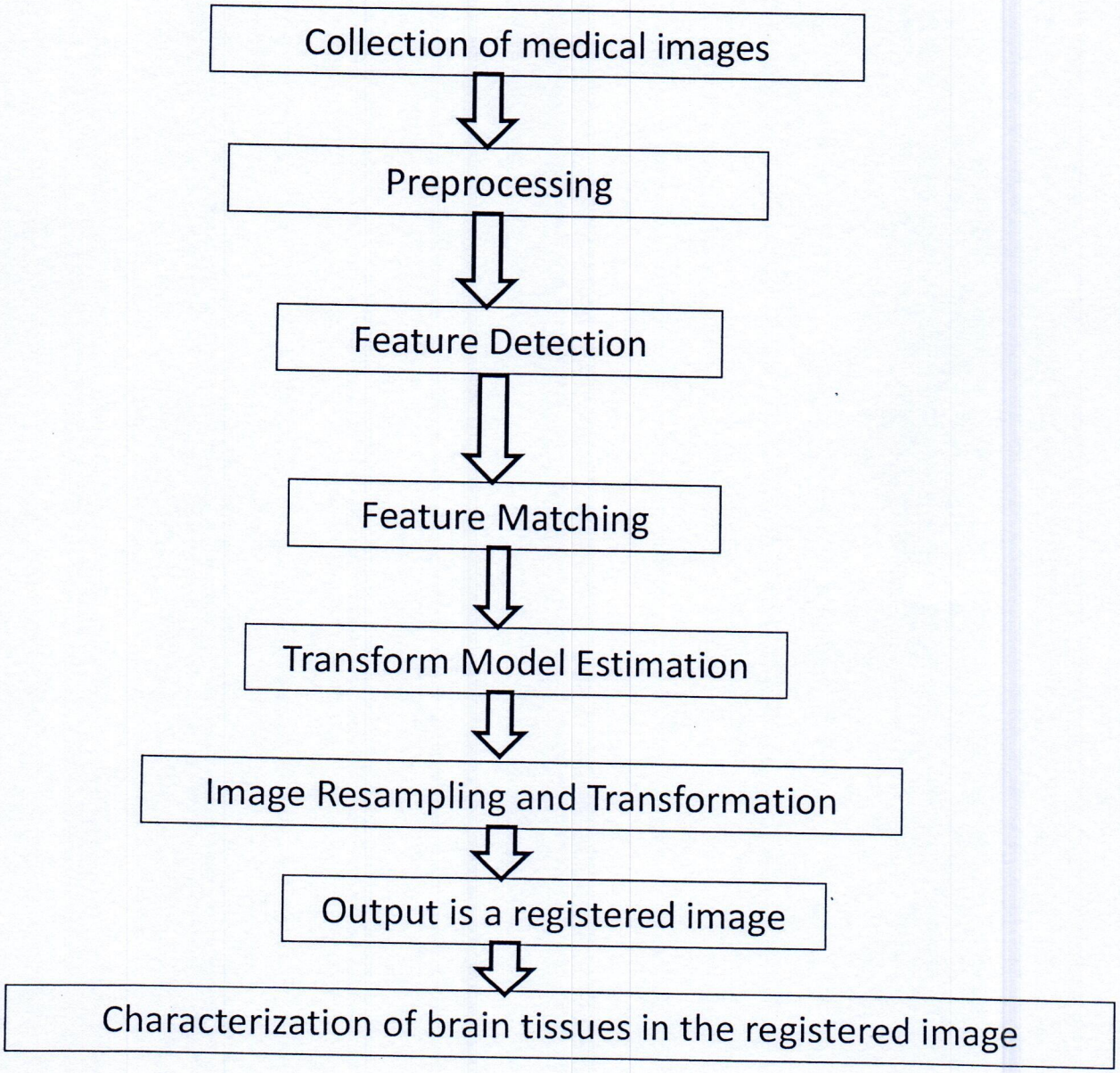
The research work will be done as follows:

- The aim is to collect the real image data bases for Cardiac, lung
- To check the accuracy of the method developed in objective 2 for cardiac and lung MR images.

OBJECTIVE 4: Characterizing the Brain Tissues of the Registered Image

- The aim is to find different statistical parameters like mean, energy of the segment, entropy etc. of the brain tissues from the registered image using MATLAB software
- The statistical characteristics of the image helps to detect the exact location of the tumor for surgery

BRIEF OUTLINE OF THE WORK:



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